**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**BOARD OF PATENT APPEALS AND INTERFERENCES**

In re patent application of:
Fan, et al.

Atty. Docket No.: YOR920030261US1

Serial No.: 10/658,623

Group Art Unit: 2129

Filed: September 9, 2003

Examiner: Davis, George B.

For: CROSS-FEATURE ANALYSIS

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**APPELLANTS' APPEAL BRIEF**

Sirs:

Appellant respectfully appeals the rejection of claims 1-26, in the Office Action dated April 17, 2007. A Notice of Appeal was timely filed on April 30, 2007.

## I. REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corporation, Armonk, New York, assignee of 100% interest of the above-referenced patent application.

## II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

## III. STATUS OF CLAIMS

Claims 1-26 are all the claims pending in the application and are set forth fully in the attached appendix (Section IX), are under appeal. Claims 1-26 were originally filed in the application on September 9, 2003. A non-final Office Action was issued on June 29, 2006 rejecting claims 1-26. The Appellants filed an Amendent under 37 C.F.R. §1.111 on July 31, 2006 amending claims 1-2, 5, 7-8, 11, 13-15, 19-21, 24 and 26. A final Office Action was issued on October 18, 2006 rejecting claims 1-26. The Appellants filed an Amendent under 37 C.F.R. §1.116 on December 12, 2006, amending claims 1-2, 5, 7-8, 11, 13-15, 19-21, 24, and 26. An Advisory Action was issued on January 12, 2007 indicating that the Amendent filed under 37 C.F.R. §1.116 on December 12, 2006 would not be entered. The Appellants filed a request for continued examination (RCE) on January 18, 2007 to force entry of the December 12, 2006 amendment. A non-final Office Action was issued on April 17, 2007, rejecting claims 1-26. The Appellants filed a Notice of Appeal on April 30, 2007.

Claims 1-26 stand rejected under 35 U.S.C. §101, as being directed to non-statutory subject matter. Claims 1-26 further stand rejected under 35 U.S.C. §112, first

paragraph, in light of the 35 U.S.C. §101 rejection. Appellants respectfully traverse these rejections based on the following discussion.

## IV. STATEMENT OF AMENDMENTS

A non-final Office Action, dated April 17, 2007, stated that claims 1-26, all the claims presently pending in the application, were rejected. Claims 1-26 shown in the appendix (Section IX) are in their amended form as submitted in the December 12, 2006 amendment and entered in response to the January 18, 2007 request for continued examination (RCE).

## V. SUMMARY OF CLAIMED SUBJECT MATTER

The Appellants' claimed invention is described on pages 1 through 5 of the specification and illustrated in Figures 1 through 5 of the application, as originally filed and published in U.S. Patent Application Publication No. 2005/0283511. It should be noted that in the following discussion all references to specific paragraph numbers are directed to the U.S. Patent Application Publication document. More specifically:

Claim 1 is for a method of automatically identifying anomalous situations during system operations. One feature of the invention as claimed in claim 1 is recording features of normal system operations in a history file. Claim 1 defines this feature as follows: "recording features of normal system operations in a history file". This feature is described at various points in the specification. For example, paragraphs [0006] and [0023] describe this feature as follows: "The invention begins with historical data 100 (possibly maintain in a history file)". Paragraph [0021] describes this feature as follows: "Assuming there is a dataset of N features." Paragraph [0024] describes this feature as "features 102 from normal computerized system operations (from the history file)." This feature is shown as item 100 in Figure 1.

Another feature of the invention as claimed in claim 1 is automatically creating a

model for each of the feature of the normal system operations in said history file. Claim 1 defines this feature as follows: "automatically creating a model for each of said features of said normal system operations in said history file". This feature is described at various points in the specification. For example, paragraphs [0006] and [0023] describe this feature as "The invention then automatically creates a model fore each feature only from normal data in the history file." Paragraph [0021] describes this feature as follows: "In order to detect anomalies, the invention converts the problem into N modes. Each model is a function to map N-1 features to I remaining features…". Paragraph [0024] further describes the details of the creating process. This feature is shown as items 102-110 in Figure 1.

Another feature of the invention as claimed in claim 1 is calculating anomaly scores of the features of the normal system operations and storing the anomaly scores in a trained file. Claim 1 defines this feature as follows: "calculating anomaly scores of said features of said normal system operations and storing said anomaly scores in a trained file". This feature is described at various points in the specification. For example, paragraphs [0008] and [0025] provide: "After so creating the model, the invention then performs training by calculating anomaly scores of the features. More specifically, the invention predicts the likelihood that each feature will be normal, when one or more of the other features are abnormal, using the models. This process is repeated using different presumptions about other features being normal and abnormal to produce a trained file of a plurality of normality and anomaly scores for each of the features. The trained file thus provides an anomaly score for each of the features for each of a plurality of different possible abnormalities." This feature is shown as item 112 in Figure 1.

Another feature of the invention as claimed in claim 1 is establishing a threshold to evaluate whether events in live system operations are anomalies as compare to the normal system operations. Claim 1 defines this feature as follows: "establishing a threshold to evaluate whether events in live system operations are anomalies as compare to said normal system operations". This feature is described at various points in the specification. For example, paragraph [0026] describes this feature as follows: "The

invention also establishes a threshold 116 to evaluate whether features are abnormal". This feature is shown as item 114 in Figure 1.

Another feature of the invention as claimed in claim 1 is automatically identifying anomalous events in the live system operations based on the anomaly scores and on the threshold. Claim 1 defines this feature as follows: "automatically identifying anomalous events in said live system operations based on said anomaly scores and on said threshold". This feature is described at various points in the specification. For example, paragraph [0024] describes this feature as follows: "The invention automatically identifies abnormal actions of the computerized system based on the anomaly scores and the threshold. More specifically, the invention determines the "true" values of the features for a given live operation of the computerized system 118. With this information, the invention refers to the trained file to retrieve an anomaly score for each of the features and then compares the anomaly score for each of the features with the threshold to determine whether each anomaly score exceeds the threshold". This feature is shown as items 116-118 in Figure 1.

Another feature of the invention as claimed in claim 1 is reporting the anomalous events. Claim 1 defines this feature as follows: "reporting said anomalous events." This feature is described at various points in the specification. For example, paragraph [0063] describes this feature as follows: "When an abnormal state happens, the inter-feature model will capture their differences from normal state and report the problem to the user of the system". This is shown in Figure 4.

Another feature of the invention as claimed in claim 1 is periodically repeating the calculating. Claim 1 defines this feature as follows: "periodically repeating said calculating." This feature is described at various points in the specification. For example, as discussed above paragraphs [0008] and [0023] provide" "After so creating the model, the invention then performs training by calculating anomaly scores of the features. More specifically, the invention predicts the likelihood that each feature will be normal, when one or more of the other features are abnormal, using the models. This process is repeated using different presumptions about other features being normal and

abnormal to produce a trained file of a plurality of normality and anomaly scores for each of the features. The trained file thus provides an anomaly score for each of the features for each of a plurality of different possible abnormalities." These paragraphs further provide: "The training process 112 [i.e., the process of calculating anomaly scores of said features of said normal system operations] can be periodically repeated." This is shown in Figure 1.

Claim 8 is similarly for a method of automatically identifying anomalous situations during system operations. One feature of the invention as claimed in claim 8 is recording features of normal system operations in a history file. Claim 1 defines this feature as follows: "recording features of normal system operations in a history file". This feature is described at various points in the specification. For example, paragraphs [0006] and [0023] describe this feature as follows: "The invention begins with historical data 100 (possibly maintain in a history file)". Paragraph [0021] describes this feature as follows: "Assuming there is a dataset of N features." Paragraph [0024] describes this feature as "features 102 from normal computerized system operations (from the history file)." This feature is shown as item 100 in Figure 1.

Another feature of the invention as claimed in claim 8 is automatically creating a model for each of the feature of the normal system operations in said history file. Claim 8 defines this feature as follows: "automatically creating a model for each of said features of said normal system operations in said history file". This feature is described at various points in the specification. For example, paragraphs [0006] and [0023] describe this feature as "The invention then automatically creates a model fore each feature only from normal data in the history file." Paragraph [0021] describes this feature as follows: "In order to detect anomalies, the invention converts the problem into N modes. Each model is a function to map N-1 features to I remaining features…". Paragraph [0024] further describes the details of the creating process. This feature is shown as items 102-110 in Figure 1.

This feature of automatically creating said model in claim 8 is further defined by claim 8 as comprising the following features: (1) establishing relationships that exist

between each of said features for said normal system operations; (2) selecting a labeled feature from said features; (3) mathematically rearranging said relationships from the point of view of said labeled feature to create a solution for said labeled feature, wherein said solution comprises a model for said labeled feature; (4) selecting different features as said labeled feature and (5) repeating said process of mathematically rearranging said relationships to produce solutions from the point of view of each remaining feature as models for the remaining features. Each of these features is described at various points in the specification. For example, each of these features is disclosed in paragraph [0024] which provides: "More specifically, in order to create the models for the features, the invention establishes relationships that exist between the features 102 for normal computerized system operations (from the history file). Then the invention selects a labled feature 104 from the features and mathematically rearranges the relationships 106 from the point of view of the labeled feature to create a solution for the labeled feature. This "solution is the model for that labeled feature. The solution comprises a mathematical statement of what the labeled feature equals in terms of the relationships between the remaining features. The invention checks whether there are any more features that need to be modeled 108. If so, the invention selects a different feature as the labeled feature 110 and repeats the process (shown by the loop in FIG. 1) of mathematically rearranging the relationships to produce solutions from the point of view of each remaining feature (as models for those remaining features)."

Another feature of the invention as claimed in claim 8 is calculating anomaly scores of the features of the normal system operations and storing the anomaly scores in a trained file. Claim 8 defines this feature as follows: "calculating anomaly scores of said features of said normal system operations and storing said anomaly scores in a trained file". This feature is described at various points in the specification. For example, paragraphs [0008] and [0025] provide: "After so creating the model, the invention then performs training by calculating anomaly scores of the features. More specifically, the invention predicts the likelihood that each feature will be normal, when one or more of the other features are abnormal, using the models. This process is repeated using different

presumptions about other features being normal and abnormal to produce a trained file of a plurality of normality and anomaly scores for each of the features. The trained file thus provides an anomaly score for each of the features for each of a plurality of different possible abnormalities." This feature is shown as item 112 in Figure 1.

Another feature of the invention as claimed in claim 8 is establishing a threshold to evaluate whether events in live system operations are anomalies as compare to the normal system operations. Claim 8 defines this feature as follows: "establishing a threshold to evaluate whether events in live system operations are anomalies as compare to said normal system operations". This feature is described at various points in the specification. For example, paragraph [0026] describes this feature as follows: "The invention also establishes a threshold 116 to evaluate whether features are abnormal". This feature is shown as item 114 in Figure 1.

Another feature of the invention as claimed in claim 8 is automatically identifying anomalous events in the live system operations based on the anomaly scores and on the threshold. Claim 8 defines this feature as follows: "automatically identifying anomalous events in said live system operations based on said anomaly scores and on said threshold". This feature is described at various points in the specification. For example, paragraph [0024] describes this feature as follows: "The invention automatically identifies abnormal actions of the computerized system based on the anomaly scores and the threshold. More specifically, the invention determines the "true" values of the features for a given live operation of the computerized system 118. With this information, the invention refers to the trained file to retrieve an anomaly score for each of the features and then compares the anomaly score for each of the features with the threshold to determine whether each anomaly score exceeds the threshold". This feature is shown as items 116-118 in Figure 1.

Another feature of the invention as claimed in claim 8 is reporting the anomalous events. Claim 8 defines this feature as follows: "reporting said anomalous events." This feature is described at various points in the specification. For example, paragraph [0063] describes this feature as follows: "When an abnormal state happens, the inter-feature

model will capture their differences from normal state and report the problem to the user of the system". This is shown in Figure 4.

Another feature of the invention as claimed in claim 8 is periodically repeating the calculating. Claim 8 defines this feature as follows: "periodically repeating said calculating." This feature is described at various points in the specification. For example, as discussed above paragraphs [0008] and [0023] provide" "After so creating the model, the invention then performs training by calculating anomaly scores of the features. More specifically, the invention predicts the likelihood that each feature will be normal, when one or more of the other features are abnormal, using the models. This process is repeated using different presumptions about other features being normal and abnormal to produce a trained file of a plurality of normality and anomaly scores for each of the features. The trained file thus provides an anomaly score for each of the features for each of a plurality of different possible abnormalities." These paragraphs further provide: "The training process 112 [i.e., the process of calculating anomaly scores of said features of said normal system operations] can be periodically repeated." This is shown in Figure 1.

Claim 14 is similarly for a method of automatically identifying anomalous situations during system operations. One feature of the invention as claimed in claim 14 is recording features of normal system operations in a history file. Claim 41 defines this feature as follows: "recording features of normal system operations in a history file". This feature is described at various points in the specification. For example, paragraphs [0006] and [0023] describe this feature as follows: "The invention begins with historical data 100 (possibly maintain in a history file)". Paragraph [0021] describes this feature as follows: "Assuming there is a dataset of N features." Paragraph [0024] describes this feature as "features 102 from normal computerized system operations (from the history file)." This feature is shown as item 100 in Figure 1.

Another feature of the invention as claimed in claim 14 is automatically creating a model for each of the feature of the normal system operations in said history file. Claim 14 defines this feature as follows: "automatically creating a model for each of said

features of said normal system operations in said history file". This feature is described at various points in the specification. For example, paragraphs [0006] and [0023] describe this feature as "The invention then automatically creates a model fore each feature only from normal data in the history file." Paragraph [0021] describes this feature as follows: "In order to detect anomalies, the invention converts the problem into N modes. Each model is a function to map N-1 features to I remaining features…". Paragraph [0024] further describes the details of the creating process. This feature is shown as items 102-110 in Figure 1.

Another feature of the invention as claimed in claim 14 is calculating anomaly scores of the features of the normal system operations and storing the anomaly scores in a trained file. Claim 14 defines this feature as follows: "calculating anomaly scores of said features of said normal system operations and storing said anomaly scores in a trained file". This feature is described at various points in the specification. For example, paragraphs [0008] and [0025] provide: "After so creating the model, the invention then performs training by calculating anomaly scores of the features. More specifically, the invention predicts the likelihood that each feature will be normal, when one or more of the other features are abnormal, using the models. This process is repeated using different presumptions about other features being normal and abnormal to produce a trained file of a plurality of normality and anomaly scores for each of the features. The trained file thus provides an anomaly score for each of the features for each of a plurality of different possible abnormalities." This feature is shown as item 112 in Figure 1.

This calculating feature in claim 14 is further defined as comprising the features of (1) "predicting a likelihood that each feature will be normal when one or more of the other features are abnormal, using said model of each of said features" and (2) "repeating said predicting using different presumptions about other features being normal and abnormal to produce said trained file of a plurality of anomaly scores for each of said features." Each of these features is described at various points in the specification. For example, paragraph [0025] provides: "After so creating the models, the invention then performs training 112 by calculating anomaly scores of the features. More specifically,

the invention predicts the likelihood that each feature will be normal, when one or more of the other features are abnormal, using the models. This process is repeated using different presumptions about other features being normal and abnormal to produce a trained file of a plurality of normality and anomaly scores for each of the features. The trained file thus provides an anomaly score for each of the features for each of a plurality of different possible abnormalities."

Another feature of the invention as claimed in claim 14 is establishing a threshold to evaluate whether events in live system operations are anomalies as compare to the normal system operations. Claim 14 defines this feature as follows: "establishing a threshold to evaluate whether events in live system operations are anomalies as compare to said normal system operations". This feature is described at various points in the specification. For example, paragraph [0026] describes this feature as follows: "The invention also establishes a threshold 116 to evaluate whether features are abnormal". This feature is shown as item 114 in Figure 1.

Another feature of the invention as claimed in claim 14 is automatically identifying anomalous events in the live system operations based on the anomaly scores and on the threshold. Claim 14 defines this feature as follows: "automatically identifying anomalous events in said live system operations based on said anomaly scores and on said threshold". This feature is described at various points in the specification. For example, paragraph [0024] describes this feature as follows: "The invention automatically identifies abnormal actions of the computerized system based on the anomaly scores and the threshold. More specifically, the invention determines the "true" values of the features for a given live operation of the computerized system 118. With this information, the invention refers to the trained file to retrieve an anomaly score for each of the features and then compares the anomaly score for each of the features with the threshold to determine whether each anomaly score exceeds the threshold". This feature is shown as items 116-118 in Figure 1.

Another feature of the invention as claimed in claim 14 is reporting the anomalous events. Claim 14 defines this feature as follows: "reporting said anomalous

events." This feature is described at various points in the specification. For example, paragraph [0063] describes this feature as follows: "When an abnormal state happens, the inter-feature model will capture their differences from normal state and report the problem to the user of the system". This is shown in Figure 4.

Another feature of the invention as claimed in claim 14 is periodically repeating the calculating. Claim 14 defines this feature as follows: "periodically repeating said calculating." This feature is described at various points in the specification. For example, as discussed above paragraphs [0008] and [0023] provide" "After so creating the model, the invention then performs training by calculating anomaly scores of the features. More specifically, the invention predicts the likelihood that each feature will be normal, when one or more of the other features are abnormal, using the models. This process is repeated using different presumptions about other features being normal and abnormal to produce a trained file of a plurality of normality and anomaly scores for each of the features. The trained file thus provides an anomaly score for each of the features for each of a plurality of different possible abnormalities." These paragraphs further provide: "The training process 112 [i.e., the process of calculating anomaly scores of said features of said normal system operations] can be periodically repeated." This is shown in Figure 1.

Claim 20 is for a program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform for a method of automatically identifying anomalous situations during system operations. One feature of the invention as claimed in claim 20 is recording features of normal system operations in a history file. Claim 20 defines this feature as follows: "recording features of normal system operations in a history file". This feature is described at various points in the specification. For example, paragraphs [0006] and [0023] describe this feature as follows: "The invention begins with historical data 100 (possibly maintain in a history file)". Paragraph [0021] describes this feature as follows: "Assuming there is a dataset of N features." Paragraph [0024] describes this feature as "features 102 from normal computerized system operations (from the history file)." This feature is shown as item

100 in Figure 1.

Another feature of the invention as claimed in claim 20 is automatically creating a model for each of the feature of the normal system operations in said history file. Claim 20 defines this feature as follows: "automatically creating a model for each of said features of said normal system operations in said history file". This feature is described at various points in the specification. For example, paragraphs [0006] and [0023] describe this feature as "The invention then automatically creates a model fore each feature only from normal data in the history file." Paragraph [0021] describes this feature as follows: "In order to detect anomalies, the invention converts the problem into N modes. Each model is a function to map N-1 features to I remaining features…". Paragraph [0024] further describes the details of the creating process. This feature is shown as items 102-110 in Figure 1.

Another feature of the invention as claimed in claim 20 is calculating anomaly scores of the features of the normal system operations and storing the anomaly scores in a trained file. Claim 20 defines this feature as follows: "calculating anomaly scores of said features of said normal system operations and storing said anomaly scores in a trained file". This feature is described at various points in the specification. For example, paragraphs [0008] and [0025] provide: "After so creating the model, the invention then performs training by calculating anomaly scores of the features. More specifically, the invention predicts the likelihood that each feature will be normal, when one or more of the other features are abnormal, using the models. This process is repeated using different presumptions about other features being normal and abnormal to produce a trained file of a plurality of normality and anomaly scores for each of the features. The trained file thus provides an anomaly score for each of the features for each of a plurality of different possible abnormalities." This feature is shown as item 112 in Figure 1.

Another feature of the invention as claimed in claim 20 is establishing a threshold to evaluate whether events in live system operations are anomalies as compare to the normal system operations. Claim 20 defines this feature as follows: "establishing a threshold to evaluate whether events in live system operations are anomalies as compare

to said normal system operations". This feature is described at various points in the specification. For example, paragraph [0026] describes this feature as follows: "The invention also establishes a threshold 116 to evaluate whether features are abnormal". This feature is shown as item 114 in Figure 1.

Another feature of the invention as claimed in claim 20 is automatically identifying anomalous events in the live system operations based on the anomaly scores and on the threshold. Claim 20 defines this feature as follows: "automatically identifying anomalous events in said live system operations based on said anomaly scores and on said threshold". This feature is described at various points in the specification. For example, paragraph [0024] describes this feature as follows: "The invention automatically identifies abnormal actions of the computerized system based on the anomaly scores and the threshold. More specifically, the invention determines the “true” values of the features for a given live operation of the computerized system 118. With this information, the invention refers to the trained file to retrieve an anomaly score for each of the features and then compares the anomaly score for each of the features with the threshold to determine whether each anomaly score exceeds the threshold". This feature is shown as items 116-118 in Figure 1.

Another feature of the invention as claimed in claim 20 is reporting the anomalous events. Claim 20 defines this feature as follows: "reporting said anomalous events." This feature is described at various points in the specification. For example, paragraph [0063] describes this feature as follows: "When an abnormal state happens, the inter-feature model will capture their differences from normal state and report the problem to the user of the system". This is shown in Figure 4.

Another feature of the invention as claimed in claim 20 is periodically repeating the calculating. Claim 20 defines this feature as follows: "periodically repeating said calculating." This feature is described at various points in the specification. For example, as discussed above paragraphs [0008] and [0023] provide” “After so creating the model, the invention then performs training by calculating anomaly scores of the features. More specifically, the invention predicts the likelihood that each feature will be

normal, when one or more of the other features are abnormal, using the models. This process is repeated using different presumptions about other features being normal and abnormal to produce a trained file of a plurality of normality and anomaly scores for each of the features. The trained file thus provides an anomaly score for each of the features for each of a plurality of different possible abnormalities." These paragraphs further provide: "The training process 112 [i.e., the process of calculating anomaly scores of said features of said normal system operations] can be periodically repeated." This is shown in Figure 1.

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues presented for review by the Board of Patents Appeals and Interferences are whether claims 1-26 are unpatentable under 35 U.S.C. §101 on the basis of the claimed invention being directed to non-statutory subject matter.

## VII. ARGUMENT

### A. The 35 U.S.C §101 Rejection Claims 1-26

#### 1. The Position in the Office Action

The position of the Examiner, as set out in paragraphs 1-14 of the Office Action dated April 17, 2007, is quoted below.

> None of the claims is limited to practical applications that indicate a specific practical utility for the claimed invention. Examiner finds that *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994) controls the 35 U.S.C. §101 issues on that point for reasons made clear by the Federal Circuit in AT&T Corp. v. Excel Communications, Inc., 50 USPQ2d 1447 (Fed. Cir. 1999). Specifically, the Federal Circuit held that the act of:

> …Taking several abstract ideas and manipulating them together adds nothing to the basic equation. *AT&T v. Excel* at 1453 quoting *In re Warmerdam*, 33 F.3d 1354, 1360 (Fed. Cir. 1994).

Examiner finds that Applicant's "history files" references are just such abstract ideas."

Examiner bases his position upon guidance provided by the Federal Circuit in *In re Warmerdam*, as interpreted by *AT&T v. Excel*. This set of precedents is within the same line of cases as the Alappat-State Street Bank decisions and is in complete agreement with those decisions. Warmerdam is consistent with State Street's holding that:

> Today we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation because it produces "a useful, concrete and tangible result" – a final share price momentarily fixed for recording purposes and even accepted and relied upon by regulatory authorities and in subsequent trades. (emphasis added) State Street Bank at 1601.

True enough, that case later eliminated the "business method exception" in order to show that business methods were not per se nonstatutory, but the court clearly did no go so far as to make business methods per se statutory. A plain reading of the excerpt above shows that the Court was very specific in its definition of the new practical application that indicates a specific practical utility for the claimed invention. It would have been much easier for the court to say that "business methods were per se statutory" than it was to define the practical application in the case as "…the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price…"

The court was being very specific.

Additionally, the court was also careful to specify that the "useful, concrete and tangible result" it found was "a final share price momentarily fixed for recording purposes and even accepted and relied upon by regulatory authorities and in subsequent trades." (i.e. the trading activity is the further practical use of the real world monetary data beyond the transformation in the computer – i.e., "post-processing activity".)

Applicant cites no such specific results to define a useful, concrete and tangible result. Neither does Applicant specify the associated practical application with the kind of specificity the Federal Circuit used.

Furthermore, in the case *In re Warmerdam*, the Federal Circuit held that:

> …The dispositive issue for assessing compliance with Section 101 in this case is whether the claim is for a process that goes beyond simply manipulating 'abstract ideas' or 'natural phenomena'…As the Supreme Court has made clear, "a[n] idea of itself is not patentable, …taking several abstract ideas and manipulating them together adds nothing to the basic equation. *In re Warmerdam* 31 USPQ2d at 1759 (emphasis added).

Since the Federal Circuit held in Warmerdam that this is the "dispositive issue" when it judged the usefulness, concreteness, and tangibility of the claim limitations in that case, Examiner in the present case views this holding as the dispositive issue for determining whether a claim is "useful, concrete, and tangible" in similar cases. Accordingly, the Examiner finds that Applicant manipulated a set of abstract "history files" to solve purely algorithmic problems in the abstract (i.e., what kind of "history files" are used? Heart rhythm data?

Algebraic equations? Boolean logic problems? Fuzzy logic algorithms? Probabilistic word problems? Philosophical ideas? Even vague expressions, about which even reasonable persons could differ as to their meaning? Combinations thereof?) Clearly, a claim for manipulation of "history files" is provably even more abstract (and thereby less limited in practical application) than pure "mathematical algorithms" which the Supreme Court has held are per se nonstatutory – in fact, it includes the expression of nonstatutory mathematical algorithms.

Since the claims are not limited to exclude such abstractions, the broadest reasonable interpretation of the claim limitations includes such abstractions. Therefore, the claims are impermissibly abstract under 35 U.S.C. §101 doctrine.

Since *Warmerdam* is within the *Alappat-State Street Bank* line of cases, it takes the same view of "useful, concrete, and tangible" the Federal Circuit applied in *State Street Bank*. Therefore, under *State Street Bank*, this could not be a "useful, concrete and tangible result". There is only manipulation of abstract ideas.

The Federal Circuit validated the use of *Warmerdam* in its more recent *AT&T Corp. v. Excel Communications, Inc.* decision. The Court reminded us that:

> Finally, **the decision in *In re Warmerdam***, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994) **is not to the contrary**. *** The court found that the claimed process did nothing more than manipulate basic mathematical constructs and concluded that '**taking several abstract ideas and manipulating them together adds nothing to the basic equation**'; hence, the court held that the claims were properly rejected under §101 … Whether one agrees with the court's conclusion on the facts, the **holding** of the case is a straightforward application of the basic principle that mere

> laws of nature, natural phenomena, and abstract ideas are not within the categories of inventions or discoveries that may be patented under §101. (emphasis added) *AT&T Corp. v. Excel Communications, Inc.*, 50 USPQ2d 1447, 1453 (Fed. Cir. 1999).

Remember that in *In re Warmerdam*, the Court said that this was the dispositive issue to be considered. In the *AT&T* decision cited above, the Court reaffirms that his is the issue for assessing the "useful, concrete, and tangible" nature of a set of claims under §101 doctrine. Accordingly, Examiner views the Warmerdam holding as the dispositive issue in this analogous case.

The fact that the invention is merely the manipulation of abs tract ideas is clear. The data referred to by Applicant's idea of "history files" is simply an abstract construct that does not provide limitations in the claims to the transformation of real world data (such as monetary data or heart rhythm data) by some disclosed process. Consequently, the necessary conclusion under AT&T, State Street and Warmerdam, is straightforward and clear. The claims take several abstract ideas (i.e., "history files" in the abstract) and manipulate them together adding nothing to the basic equation. Claims 1-26 are, thereby, rejected under 35 U.S.C. §101.

**2. The Appellants' Position Regarding The Rejection of Claims 1-26 under 35 U.S.C. §101**

The Appellants respectfully, but strongly, disagree with the Examiner's position that none of the claims is limited to practical applications that indicate a specific practical utility for the claimed invention.

(a) Appellants' Position Regarding Rejection Of Independent Claims 1 and 20

In rejecting independent claims 1 and 20 under 35 U.S.C. §101 for being directed to non-statutory subject matter, the Examiner indicated that *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994), which held that "...Taking several abstract ideas and manipulating them together adds nothing to the basic equation", was controlling. Specifically, the Examiner determined that the claimed invention did not have a useful, concrete and tangible result because the Appellant "manipulated a set of abstract 'history files' to solve purely algorithmic problems in the abstract". The Examiner further provided that "the fact that the invention is merely the manipulation of abstract ideas is clear. The data referred to by Applicant's idea of "history files" is simply an abstract construct that does not provide limitations in the claims to the transformation of real world data (such as monetary data or heart rhythm data) by some disclosed process. Consequently, the necessary conclusion under AT&T, State Street and Warmerdam, is straight forward and clear. The claims take several abstract ideas (i.e., "history files" in the abstract) and manipulate them together adding nothing to the basic equation." The Appellants respectfully disagree.

Independent claims 1 and 20 each include the claim limitations of "recording features of normal system operations in a history file" and "creating a model for each of said features of said normal system operations in said history file". These limitations imply that during normal system operations features of the system are determined in some manner. The features are then recorded (e.g., as historical data) in a history file. Then, for each feature in the history file, a model is created. This aspect of the invention is explained in detail throughout the disclosure. For example, the Abstract provides that the system records actions performed as features in a history file and automatically creates a model for each feature. Paragraphs [0006] and [0023] provide that the invention begins with historical data maintained in a history file and that a model is created for each feature only from normal data in the history file. Paragraph [0020] references a dataset of N features from which N models are created. Therefore, the Appellants submit that contrary to the Examiner's finding the "history files" are not just abstract ideas, but rather contain real world data (i.e., a recording of features of normal

system operations) from which models are created (i.e., a model is created for each feature of normal system operations that is recorded).

Furthermore, if, as indicated by the Examiner, the data referred to by the "history files" is simply an abstract construct that did not provide limitations in the claims to the transformation of real world data by some disclosed process, it was still incumbent upon the Examiner to determine whether the method otherwise produces a useful, concrete or tangible result. That is, it is generally understood that to establish utility under 35 U.S.C. §101 method inventions as a whole must produce a "useful, concrete and tangible result." (see *State Street*, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02). Additionally, *AT&T Corp v. Excel Communications, Inc.* 172 F.3d 1352, 1358-59, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999) provides that physical transformation "is not an invariable requirement, but merely one example, of how a mathematical algorithm [or law of nature] may bring about a useful application." If the Examiner determines that there is no physical transformation, additional review is required to determine if the claim provides a useful, tangible and concrete result. The review by the Examiner should focus not on each step, but on whether the final result achieved by the claimed invention is "useful, concrete and tangible" (see AT&T 172 F.3d at 1358-5).

The Appellants submit that the results of the method embodiments disclosed are "useful." Specifically, the Appellants submit that a credible, specific, and substantial use for the method of the invention (namely identifying and reporting anomalous events that occur during system operations) is readily apparent and well-established in the independent claims themselves. That is, each of the independent claims provides for a method of automatically identifying anomalous situations that occur during system operations. The limiting features in each of the claims include, but are not limited to, the following: (1) "recording features of normal system operations in a history file;" (2) "automatically creating a model for each of said features of said normal system operations in said history file;" (3) "calculating anomaly scores of said features of said normal system operations and storing said anomaly scores in a trained file;" (4) "establishing a threshold to evaluate whether events in live system operations are

anomalies as compared to said normal system operations;" (5) "automatically ***identifying anomalous events in said live system operations*** based on said anomaly scores and on said threshold;" (6) "***reporting said anomalous events***;" and (7) "periodically repeating said calculating." Those skilled in the art would immediately appreciate why the invention is useful (i.e., would appreciate why it is important to be able to identify when anomalous events occur during system operations and to report out the occurrence of those anomalous events).

This credible, specific, and substantial use for the method of the invention (namely identifying and reporting anomalous events that occur during live system operations) is further asserted in the disclosure at paragraph [0004]. That is, in order to achieve a goal of autonomic computing it is important that a target system be able to perform self-diagnosis. Per paragraph [0018], the claimed invention provides a general solution to conventional problems associated with self-diagnosis by providing a method that uses an additive approach to combine evidence from multiple sources (i.e., history files) and then uses a probabilitstic thresholding approach to detect anomalies. These detected anomalies can be reported to a system user (see paragraph [0063]). Per paragraph [0064], the claimed invention is superior to prior art systems because it takes advantage of inter-feature correlation and predicts the value of one feature using values of other features and because it uses a threshold to predict anomalies.

Furthermore, the Appellants submit that the results of the method embodiments disclosed are also "tangible" and "concrete." Specifically, the claim limitations of "identifying anomalous events in said live system operations" and "reporting said anomalous events" are beneficial real-world results of performing the method of the invention (i.e., they are tangible and not abstract results, see *Gottschalk v. Benson*, 409 U.S. 63, 71-72, 175 USPQ 673, 676 (1972)). That is, as system operations occur, the method is able to identify anomalous events that occur and to report out those events. The process steps are not abstract or theoretical. Additionally, the claim limitations of "identifying anomalous events in said live system operations" and "reporting said anomalous events" are substantially repeatable (i.e., concrete, see In re Swartz, 232 F.3d

862, 864, 56 USPQ2d 1703, 1704 (Fed. Cir. 2000). That is, as the live system operations proceed, the method will be able to identify and report out each anomalous event that occurs. The identification process is based on the previously calculated anomaly scores and previously established threshold. To ensure that the anomalous events will continue to be properly identified throughout the live system operations, the claim limitation of periodically recalculating the anomaly scores is also included.

Therefore, independent claims 1 and 20 are directed to statutory subject matter under 35 U.S.C. §101. Further, dependent claims 2-7 and 21-26 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. Moreover, the Appellants note that all claims are properly supported in the specification and accompanying drawings. In view of the foregoing, the Board is respectfully requested to reconsider and withdraw the rejections.

(b) Appellants' Position Regarding The Rejection of Independent Claim 8

In rejecting independent claim 8 under 35 U.S.C. §101 for being directed to non-statutory subject matter, the Examiner indicated that *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994), which held that "…Taking several abstract ideas and manipulating them together adds nothing to the basic equation", was controlling. Specifically, the Examiner determined that the claimed invention did not have a useful, concrete and tangible result because the Appellant "manipulated a set of abstract 'history files' to solve purely algorithmic problems in the abstract". The Examiner further provided that "the fact that the invention is merely the manipulation of abstract ideas is clear. The data referred to by Applicant's idea of "history files" is simply an abstract construct that does not provide limitations in the claims to the transformation of real world data (such as monetary data or heart rhythm data) by some disclosed process. Consequently, the necessary conclusion under At&T, State Street and Warmerdam, is straight forward and clear. The claims take several abstract ideas (i.e., "history files" in

the abstract) and manipulate them together adding nothing to the basic equation." The Appellants respectfully disagree.

Independent claim 8 includes the claim limitations of "recording features of normal system operations in a history file" and "creating a model for each of said features of said normal system operations in said history file". These limitations imply that during normal system operations features of the system are determined in some manner. The features are then recorded (e.g., as historical data) in a history file. Then, for each feature in the history file, a model is created. This aspect of the invention is explained in detail throughout the disclosure. For example, the Abstract provides that the system records actions performed as features in a history file and automatically creates a model for each feature. Paragraphs [0006] and [0023] provide that the invention begins with historical data maintained in a history file and that a model is created for each feature only from normal data in the history file. Paragraph [0020] references a dataset of N features from which N models are created. Therefore, the Appellants submit that contrary to the Examiner's finding the "history files" are not just abstract ideas, but rather contain real world data (i.e., a recording of features of normal system operations) from which models are created (i.e., a model is created for each feature of normal system operations that is recorded).

Furthermore, if, as indicated by the Examiner, the data referred to by the "history files" is simply an abstract construct that did not provide limitations in the claims to the transformation of real world data by some disclosed process, it was still incumbent upon the Examiner to determine whether the method otherwise produces a useful, concrete or tangible result. That is, it is generally understood that to establish utility under 35 U.S.C. §101 method inventions as a whole must produce a "useful, concrete and tangible result." (see *State Street*, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02). Additionally, *AT&T Corp v. Excel Communications, Inc.* 172 F.3d 1352, 1358-59, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999) provides that physical transformation "is not an invariable requirement, but merely one example, of how a mathematical algorithm [or law of nature] may bring about a useful application." If the Examiner determines that there is no physical

transformation, additional review is required to determine if the claim provides a useful, tangible and concrete result. The review by the Examiner should focus not on each step, but one whether the final result achieved by the claimed invention is "useful, concrete and tangible" (see *AT&T* 172 F.3d at 1358-59).

The Appellants submit that the results of the method embodiments disclosed are "useful." Specifically, the Appellants submit that a credible, specific, and substantial use for the method of the invention (namely identifying and reporting anomalous events that occur during system operations) is readily apparent and well-established in the independent claims themselves. That is, claim 8 provides for a method of automatically identifying anomalous situations that occur during system operations. The limiting features in claim 8 include, but are not limited to, the following: (1) "recording features of normal system operations in a history file;" (2) "automatically creating a model for each of said features of said normal system operations in said history file;" (3) "calculating anomaly scores of said features of said normal system operations and storing said anomaly scores in a trained file;" (4) "establishing a threshold to evaluate whether events in live system operations are anomalies as compared to said normal system operations;" (5) "automatically ***identifying anomalous events in said live system operations*** based on said anomaly scores and on said threshold;" (6) "***reporting said anomalous events***;" (7) "periodically repeating said calculating"; and (8) "wherein said creating of said model for each of said features comprises: establishing relationships that exist between each of said features for said normal system operations; selecting a labeled feature from said features; mathematically rearranging said relationships from the point of view of said labeled feature to create a solution for said labeled feature, wherein said solution comprises a model for said labeled feature; selecting different features as said labeled feature and repeating said process of mathematically rearranging said relationships to produce solutions from the point of view of each remaining feature as models for the remaining features." Those skilled in the art would immediately appreciate why the invention is useful (i.e., would appreciate why it is important to be able to identify when anomalous events occur during system operations and to report out

the occurrence of those anomalous events).

This credible, specific, and substantial use for the method of the invention (namely identifying and reporting anomalous events that occur during live system operations) is further asserted in the disclosure at paragraph [0004]. That is, in order to achieve a goal of autonomic computing it is important that a target system be able to perform self-diagnosis. Per paragraph [0018], the claimed invention provides a general solution to conventional problems associated with self-diagnosis by providing a method that uses an additive approach to combine evidence from multiple sources (i.e., history files) and then uses a probabilitstic thresholding approach to detect anomalies. These detected anomalies can be reported to a system user (see paragraph [0063]). Per paragraph [0064], the claimed invention is superior to prior art systems because it takes advantage of inter-feature correlation and predicts the value of one feature using values of other features and because it uses a threshold to predict anomalies.

Furthermore, the Appellants submit that the results of the method embodiments disclosed are also "tangible" and "concrete." Specifically, the claim limitations of "identifying anomalous events in said live system operations" and "reporting said anomalous events" are beneficial real-world results of performing the method of the invention (i.e., they are tangible and not abstract results, see *Gottschalk v. Benson*, 409 U.S. 63, 71-72, 175 USPQ 673, 676 (1972)). That is, as system operations occur, the method is able to identify anomalous events that occur and to report out those events. These process steps are not abstract or theoretical. Additionally, the claim limitations of "identifying anomalous events in said live system operations" and "reporting said anomalous events" are substantially repeatable (i.e., concrete, see In re Swartz, 232 F.3d 862, 864, 56 USPQ2d 1703, 1704 (Fed. Cir. 2000). That is, as the live system operations proceed, the method will be able to identify and report out each anomalous event that occurs. The identification process is based on the previously calculated anomaly scores and previously established threshold. To ensure that the anomalous events will continue to be properly identified throughout the live system operations, the claim limitation of periodically recalculating the anomaly scores is also included.

Therefore, independent claim 8 is directed to statutory subject matter under 35 U.S.C. §101. Further, dependent claims 9-14 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. Moreover, the Appellants note that all claims are properly supported in the specification and accompanying drawings. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections.

(c) Appellants' Position Regarding The Rejection of Independent Claim 14

In rejecting independent claim 14 under 35 U.S.C. §101 for being directed to non-statutory subject matter, the Examiner indicated that *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994), which held that "...Taking several abstract ideas and manipulating them together adds nothing to the basic equation", was controlling. Specifically, the Examiner determined that the claimed invention did not have a useful, concrete and tangible result because the Appellant "manipulated a set of abstract 'history files' to solve purely algorithmic problems in the abstract". The Examiner further provided that "the fact that the invention is merely the manipulation of abstract ideas is clear. The data referred to by Applicant's idea of "history files" is simply an abstract construct that does not provide limitations in the claims to the transformation of real world data (such as monetary data or heart rhythm data) by some disclosed process. Consequently, the necessary conclusion under AT&T, State Street and Warmerdam, is straight forward and clear. The claims take several abstract ideas (i.e., "history files" in the abstract) and manipulate them together adding nothing to the basic equation." The Appellants respectfully disagree.

Independent claim 14 includes the claim limitations of "recording features of normal system operations in a history file" and "creating a model for each of said features of said normal system operations in said history file". These limitations imply that

during normal system operations features of the system are determined in some manner. The features are then recorded (e.g., as historical data) in a history file. Then, for each feature in the history file, a model is created. This aspect of the invention is explained in detail throughout the disclosure. For example, the Abstract provides that the system records actions performed as features in a history file and automatically creates a model for each feature. Paragraphs [0006] and [0023] provide that the invention begins with historical data maintained in a history file and that a model is created for each feature only from normal data in the history file. Paragraph [0020] references a dataset of N features from which N models are created. Therefore, the Appellants submit that contrary to the Examiner's finding the "history files" are not just abstract ideas, but rather contain real world data (i.e., a recording of features of normal system operations) from which models are created (i.e., a model is created for each feature of normal system operations that is recorded).

Furthermore, if, as indicated by the Examiner, the data referred to by the "history files" is simply an abstract construct that did not provide limitations in the claims to the transformation of real world data by some disclosed process, it was still incumbent upon the Examiner to determine whether the method otherwise produces a useful, concrete or tangible result. That is, it is generally understood that to establish utility under 35 U.S.C. §101 method inventions as a whole must produce a "useful, concrete and tangible result." (see *State Street*, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02). Additionally, *AT&T Corp v. Excel Communications, Inc.* 172 F.3d 1352, 1358-59, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999) provides that physical transformation "is not an invariable requirement, but merely one example, of how a mathematical algorithm [or law of nature] may bring about a useful application." If the Examiner determines that there is no physical transformation, additional review is required to determine if the claim provides a useful, tangible and concrete result. The review by the Examiner should focus not on each step, but on whether the final result achieved by the claimed invention is "useful, concrete and tangible" (see *AT&T* 172 F.3d at 1358-59).

The Appellants submit that the results of the method embodiments disclosed are

"useful." Specifically, the Appellants submit that a credible, specific, and substantial use for the method of the invention (namely identifying and reporting anomalous events that occur during system operations) is readily apparent and well-established in the independent claims themselves. That is, each of the independent claims provides for a method of automatically identifying anomalous situations that occur during system operations. The claim limitations in claim 14 include, but are not limited to, the following: (1) "recording features of normal system operations in a history file;" (2) "automatically creating a model for each of said features of said normal system operations in said history file;" (3) "calculating anomaly scores of said features of said normal system operations and storing said anomaly scores in a trained file;" (4) "establishing a threshold to evaluate whether events in live system operations are anomalies as compared to said normal system operations;" (5) "automatically ***identifying anomalous events in said live system operations*** based on said anomaly scores and on said threshold;" (6) "***reporting said anomalous events***;" (7) "periodically repeating said calculating"; and (8) "wherein said calculating comprises: predicting a likelihood that each feature will be normal when one or more of the other features are abnormal, using said model of each of said features; repeating said predicting using different presumptions about other features being normal and abnormal to produce said trained file of a plurality of anomaly scores for each of said features." Those skilled in the art would immediately appreciate why the invention is useful (i.e., would appreciate why it is important to be able to identify when anomalous events occur during system operations and to report out the occurrence of those anomalous events).

This credible, specific, and substantial use for the method of the invention (namely identifying and reporting anomalous events that occur during live system operations) is further asserted in the disclosure at paragraph [0004]. That is, in order to achieve a goal of autonomic computing it is important that a target system be able to perform self-diagnosis. Per paragraph [0018], the claimed invention provides a general solution to conventional problems associated with self-diagnosis by providing a method that uses an additive approach to combine evidence from multiple sources (i.e., history

files) and then uses a probabilitstic thresholding approach to detect anomalies. These detected anomalies can be reported to a system user (see paragraph [0063]). Per paragraph [0064], the claimed invention is superior to prior art systems because it takes advantage of inter-feature correlation and predicts the value of one feature using values of other features and because it uses a threshold to predict anomalies.

Furthermore, the Appellants submit that the results of the method embodiments disclosed are also "tangible" and "concrete." Specifically, the claim limitations of "identifying anomalous events in said live system operations" and "reporting said anomalous events" are beneficial real-world results of performing the method of the invention (i.e., they are tangible and not abstract results, see *Gottschalk v. Benson*, 409 U.S. 63, 71-72, 175 USPQ 673, 676 (1972)). That is, as system operations occur, the method is able to identify anomalous events that occur and to report out those events. These claim limitations are neither abstract nor theoretical. Additionally, the claim limitations of "identifying anomalous events in said live system operations" and "reporting said anomalous events" are substantially repeatable (i.e., concrete, see In re Swartz, 232 F.3d 862, 864, 56 USPQ2d 1703, 1704 (Fed. Cir. 2000). That is, as the live system operations proceed, the method will be able to identify and report out each anomalous event that occurs. The identification process is based on the previously calculated anomaly scores and previously established threshold. To ensure that the anomalous events will continue to be properly identified throughout the live system operations, the claim limitation of periodically recalculating the anomaly scores is also included.

Therefore, independent claim 14 is directed to statutory subject matter under 35 U.S.C. §101. Further, dependent claims 15-19 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. Moreover, the Appellants note that all claims are properly supported in the specification and accompanying drawings. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections.

### B. The 35 U.S.C §112 Rejection Claims 1-26

#### 1. The Position in the Office Action

The position of the Examiner, as set out in paragraphs 1-14 of the Office Action dated April 17, 2007 is quoted below.

> Claims 1-26 are rejected under 35 U.S.C. §112, first paragraph because the current case law (and accordingly, the MPEP) require such a rejection if a §101 rejection is given because when Applicant has not in fact disclosed the practical application for the invention, as a matter of law there is no way Applicant could have disclosed how to practice the undisclosed practically application.

#### 2. The Appellants' Position Regarding Claims 1, 8, 14, and 20 under 35 U.S.C. §112

Given the Appellants position that claims 1-26 are directed to statutory subject matter under 35 U.S.C. §101 (see above discussion in section VII A.2) and further given the fact that the only basis for the rejection of claims 1-26 under 35 U.S.C. §112 is the existence of the rejection of those claims under 35 U.S.C §101 rejections, the Board is respectfully requested to reconsider and withdraw the rejections.

## VIII. CONCLUSION

In view of the foregoing, the Appellants respectfully submit that independent claims 1, 8, 14, and 20, and dependent claims 2-7, 9-13, 15-19, and 21-26 are similarly patentable, not only by virtue of their dependency from patentable independent claims, respectively, but also by virtue of the additional features of the Appellants' claimed

invention they define. Thus, the Appellants respectfully request that the Board reconsider and withdraw the rejections of claims 1-26 and pass these claims to issue.

Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 50-0510.

Respectfully submitted,

Date: May 24, 2007

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## IX. CLAIMS APPENDIX

1. A method of automatically identifying anomalous situations during system operations, said method comprising:

recording features of normal system operations in a history file;

automatically creating a model for each of said features of said normal system operations in said history file;

calculating anomaly scores of said features of said normal system operations and storing said anomaly scores in a trained file;

establishing a threshold to evaluate whether events in live system operations are anomalies as compared to said normal system operations;

automatically identifying anomalous events in said live system operations based on said anomaly scores and on said threshold;

reporting said anomalous events; and

periodically repeating said calculating.

2. The method in claim 1, wherein said creating comprises:

establishing relationships that exist between each of said features of said normal system operations;

selecting a labeled feature from said features;

mathematically rearranging said relationships from the point of view of said labeled feature to create a solution for said labeled feature, wherein said solution

comprises a model for said labeled feature;

selecting different features as said labeled feature and repeating said process of mathematically rearranging said relationships to produce solutions from the point of view of each remaining feature as models for the remaining features.

3. The method in claim 2, wherein said solution comprises a mathematical statement of what said labeled feature equals in terms of the relationships between the remaining features.

4. The method in claim 2, wherein said normal system operations comprise said features in said history file at the time said models are created.

5. The method in claim 1, wherein said calculating comprises:

predicting a likelihood that said each feature will be normal when one or more of the other features are abnormal, using said model of each of said features;

repeating said predicting using different presumptions about other features being normal and abnormal to produce said trained file of a plurality of anomaly scores for each of said features.

6. The method in claim 5, wherein said trained file provides an normally score for each of said features for each of a plurality of different possible abnormalities.

7. The method in claim 5, wherein said automatically identifying comprises:

determining values of features for a given operation of said system;

referring to said trained file to retrieve an anomaly score for each of said features of said given operation;

comparing said anomaly score for each of said features of said given operation with said threshold to determine whether each anomaly score exceeds said threshold.

8. A method of automatically identifying anomalous situations during system operations, said method comprising:

recording features of normal system operations in a history file;

automatically creating a model for each of said features of said normal system operations in said history file;

calculating anomaly scores of said features of said normal system operations and storing said anomaly scores in a trained file;

establishing a threshold to evaluate whether events in live system operations are anomalies as compared to said normal system operations;

automatically identifying anomalous events in said live system operations based on said anomaly scores and on said threshold;

reporting said anomalous event; and

periodically repeating said calculating;

wherein said creating of said model for each of said features comprises:

establishing relationships that exist between each of said features for said

normal system operations;

selecting a labeled feature from said features;

mathematically rearranging said relationships from the point of view of said labeled feature to create a solution for said labeled feature, wherein said solution comprises a model for said labeled feature;

selecting different features as said labeled feature and repeating said process of mathematically rearranging said relationships to produce solutions from the point of view of each remaining feature as models for the remaining features.

9. The method in claim 8, wherein said solution comprises a mathematical statement of what said labeled feature equals in terms of the relationships between the remaining features.

10. The method in claim 8, wherein said normal system operations comprise said features in said history file at the time said models are created.

11. The method in claim 8, wherein said calculating comprises:

predicting a likelihood that each feature will be normal when one or more of the other features are abnormal, using said model of each of said features;

repeating said predicting using different presumptions about other features being normal and abnormal to produce said trained file of a plurality of anomaly scores for each of said features.

12. The method in claim 11, wherein said trained file provides an normally score for each of said features for each of a plurality of different possible abnormalities.

13. The method in claim 11, wherein said automatically identifying comprises:

determining values of features for a given operation of said system;

referring to said trained file to retrieve an anomaly score for each of said features of said given operation;

comparing said anomaly score for each of said features of said given operation with said threshold to determine whether each anomaly score exceeds said threshold.

14. A method of automatically identifying anomalous situations during system operations, said method comprising:

recording features of normal system operations in a history file;

automatically creating a model for each of said features of said normal system operations in said history file;

calculating anomaly scores of said features of said normal system operations and storing said anomaly scores in a trained file;

establishing a threshold to evaluate whether events in live system operations are anomalies as compared to said normal system operations;

automatically identifying anomalous events in said system operations based on said anomaly scores and on said threshold;

reporting said anomalous events; and

periodically repeating said calculating;

wherein said calculating comprises:

predicting a likelihood that each feature will be normal when one or more of the other features are abnormal, using said model of each of said features;

repeating said predicting using different presumptions about other features being normal and abnormal to produce said trained file of a plurality of anomaly scores for each of said features.

15. The method in claim 14, wherein said creating comprises:

establishing relationships that exist between each of said features for said normal system operations;

selecting a labeled feature from said features;

mathematically rearranging said relationships from the point of view of said labeled feature to create a solution for said labeled feature, wherein said solution comprises a model for said labeled feature;

selecting different features as said labeled feature and repeating said process of mathematically rearranging said relationships to produce solutions from the point of view of each remaining feature as models for the remaining features.

16. The method in claim 15, wherein said solution comprises a mathematical statement of what said labeled feature equals in terms of the relationships between the

remaining features.

17. The method in claim 15, wherein said normal system operations comprise said features in said history file at the time said models are created.

18. The method in claim 14, wherein said trained file provides a normally score for each of said features for each of a plurality of different possible abnormalities.

19. The method in claim 14, wherein said automatically identifying comprises:

determining values of features for a given operation of said system;

referring to said trained file to retrieve an anomaly score for each of said features of said given operation;

comparing said anomaly score for each of said features of said given operation with said threshold to determine whether each anomaly score exceeds said threshold.

20. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform a method of automatically identifying anomalous situations during system operations, said method comprising:

recording features of normal system operations in a history file;

automatically creating a model for said each of said features of said normal system operations in said history file;

calculating anomaly scores of said features of said normal system operations and

storing said anomaly scores in a file;

establishing a threshold to evaluate whether events in live system operations are anomalies as compared to said normal system operations;

automatically identifying anomalous events in said live system operations based on said anomaly scores and on said threshold;

reporting said anomalous events; and

periodically repeating said calculating.

21. The program storage device in claim 20, wherein creating comprises:

establishing relationships that exist between each of said features for said normal system operations;

selecting a labeled feature from said features;

mathematically rearranging said relationships from the point of view of said labeled feature to create a solution for said labeled feature, wherein said solution comprises a model for said labeled feature;

selecting different features as said labeled feature and repeating said process of mathematically rearranging said relationships to produce solutions from the point of view of each remaining feature as models for the remaining features.

22. The program storage device in claim 21, wherein said method further comprises a mathematical statement of what said labeled feature equals in terms of the relationships between the remaining features.

23. The program storage device in claim 21, wherein said normal system operations comprise said features in said history file at the time said models are created.

24. The program storage device in claim 20, wherein said calculating further comprises:

predicting a likelihood that each feature will be normal when one or more of the other features are abnormal, using said model of each of said features;

repeating said predicting using different presumptions about other features being normal and abnormal to produce said trained file of a plurality of anomaly scores for each of said features.

25. The program storage device in claim 24, wherein said trained file provides an normally score for each of said features for each of a plurality of different possible abnormalities.

26. The program storage device in claim 24, wherein said automatically identifying comprises:

determining values of features for a given operation of said system;

referring to said trained file to retrieve an anomaly score for each of said features of said given operation;

comparing said anomaly score for each of said features of said given operation

with said threshold to determine whether each anomaly score exceeds said threshold.

## X. EVIDENCE APPENDIX

There is no other evidence known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

## XI. RELATED PROCEEDINGS APPENDIX

There is no other related proceedings known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.